CLAIMS

1. An organic semiconductor inverting circuit, comprising:

at least three organic transistors, one of which is an input transistor having a gate to which is coupled an input terminal;

an output terminal coupled to a first electrode of at least one of the at least three organic transistors;

a reference supply voltage input coupled to a second electrode of at least one of the at least three organic transistors;

a first positive supply voltage input coupled to a second electrode of at least one of the at least three organic transistors; and

a negative supply voltage input coupled to a first electrode of at least one of the at least three organic transistors.

2. The organic semiconductor inverting circuit according to claim 1, wherein absolute values of voltages coupled to the first positive supply voltage input and the negative supply voltage input with reference to a voltage coupled to the reference supply voltage input are substantially equal.

3. The organic semiconductor inverting circuit according to claim 2, wherein an absolute gain of the organic semiconductor inverting circuit is greater than one over a range of voltage applied to the input terminal.

4. The organic semiconductor inverting circuit according to claim 2 comprising a selected channel material and set of channel geometries, wherein transfer characteristics of the organic semiconductor inverting circuit are such that a ring oscillator circuit operation is obtained using the organic semiconductor inverting circuit with a plurality of organic semiconductor inverting circuits having essentially identical channel material and sets of channel geometries.

5. The organic semiconductor inverting circuit according to claim 1, wherein a first electrode of the input transistor is coupled to a second electrode and a gate of one of the at least three organic transistors that has a first electrode coupled to the negative supply voltage input, and wherein the second electrode

of the input transistor is coupled to the first positive supply voltage input, and wherein the first electrode of the input transistor is also coupled to a first electrode of another of the at least three organic transistors, which has a second electrode coupled to the reference supply voltage input and a gate coupled to a second positive supply voltage input.

6. The organic semiconductor inverting circuit according to claim 5, wherein a voltage coupled to the second positive supply voltage input is less positive than a voltage applied to the first positive supply voltage input with reference to a voltage at the reference supply voltage input.

7. The organic semiconductor inverting circuit according to claim 5, wherein the second positive supply voltage input is connected to one of the first positive supply voltage input and the reference supply voltage input.

8. The organic semiconductor inverting circuit according to claim 1, further comprising a fourth organic transistor, wherein a first electrode of the input transistor is coupled to a second electrode and a gate of one of the at least three organic transistors that has a first electrode coupled to the negative supply voltage input, and wherein the second electrode of the input transistor is coupled to the reference supply voltage input, and wherein the input terminal is also coupled to a gate of another of the at least three organic transistors that has a second electrode coupled to the first positive supply voltage input and a first electrode coupled to an output terminal and a second electrode of the fourth organic transistor that has a gate coupled to the first electrode of the input transistor and a first electrode coupled to the negative supply voltage input.

9. The organic semiconductor inverting circuit according to claim 1, further comprising a fourth organic transistor, wherein a first electrode of the input transistor is coupled to a second electrode and a gate of one of the at least three organic transistors that has a first electrode coupled to the negative supply voltage input, and wherein a second electrode of the input transistor is coupled to the reference supply voltage input, and wherein the input terminal is

also coupled to a gate of another of the at least three organic transistors that has a second electrode coupled to the first positive supply voltage input and a first electrode coupled to a second terminal of the fourth organic transistor,which has a gate and a first electrode coupled to the first electrode of the input transistor.

10. The organic semiconductor inverting circuit according to claim 9, further comprising an output terminal coupled to one of the first and second electrodes of the fourth organic transistor.

11. The organic semiconductor inverting circuit according to claim 1, further comprising a fourth organic transistor, wherein a first electrode of the input transistor is coupled to a second electrode and a gate of one of the at least three organic transistors that has a first electrode coupled to the negative supply voltage input, and wherein the second electrode of the input transistor is coupled to the reference supply voltage input, and wherein the input terminal is also coupled to a gate of another of the at least three organic transistors that has a second electrode coupled to the first positive supply voltage input and a first electrode coupled to a gate and a second electrode of the fourth organic transistor, which has a first electrode coupled to the first electrode of the input transistor.

12. The organic semiconductor inverting circuit according to claim 11, further comprising an output terminal that is coupled to one of first and second electrodes of the fourth organic transistor.

13. The organic semiconductor inverting circuit according to Claim 1, where the on/off ratio of at least one organic transistor of the three organic transistors is less than 100,000.

14. The organic semiconductor inverting circuit according to Claim 1, where at least one element of each of the at least three organic transistors is formed by a printing process.

15. The organic semiconductor inverting circuit according to Claim 1, where at least one element of each of the at least three organic transistors is deposited by one of the group of processes consisting of gravure, flexography, intaglio, screen printing, micro dispensing, micro contact printing, and lithographic printing.

16. A logic circuit, comprising:

an organic semiconductor inverting circuit comprising,

at least three organic transistors, one of which is an input transistor having a gate to which is coupled an input terminal,

an output terminal coupled to a first electrode of at least one of the at least three organic transistors,

a reference supply voltage input coupled to a second electrode of at least one of the at least three organic transistors,

a first positive supply voltage input coupled to a second electrode of at least one of the at least three organic transistors, and

a negative supply voltage input coupled to a first electrode of at least one of the at least three organic transistors; and

at least one of a NAND, NOR, AND, and OR circuit coupled to the organic semiconductor inverting circuit.

17. An oscillator circuit, comprising:

one or more organic semiconductor inverting circuits, each comprising:

at least three organic transistors, one of which is an input transistor having a gate to which is coupled an input terminal;

an output terminal coupled to a first electrode of at least one of the at least three organic transistors;

a reference supply voltage input coupled to a second electrode of at least one of the at least three organic transistors;

a first positive supply voltage input coupled to a second electrode of at least one of the at least three organic transistors; and

a negative supply voltage input coupled to a first electrode of at least one of the at least three organic transistors,

wherein an odd number of the one or more organic semiconductor inverting circuits are coupled in series.